

CLAIMS

1. (Previously amended) A method of controlling transmit powers at a plurality of base stations during a soft handoff to reduce power imbalance between base stations, the method comprising:

determining a common reference power for a plurality of base stations for a power control interval based on power measurement reports from one or more mobile stations, said power control interval comprising a plurality of power adjustment intervals;

receiving power control commands at the base stations from a mobile station in soft handoff during a plurality of power adjustment intervals in said power control interval;

adjusting the transmit powers at the respective base stations during each of said plurality of power adjustment intervals responsive to the power control commands from the mobile station by applying power adjustments to current transmit powers of the base stations; and

varying a step size of the power adjustments during each of said plurality of power adjustment intervals as a function of the current transmit powers and the common reference power.

2. (Original) The method of claim 1, wherein varying a step size of the power adjustments as a function of the current transmit powers and a common reference power comprises varying the step size of the power adjustment at each base station

based on a difference between the current transmit power of the base station and the common reference power.

3. (Original) The method of claim 2, wherein varying the step size of the power adjustment at each base station based on a difference between the current transmit power of the base station and the common reference power comprises:

increasing the step size if the power control commands from the mobile station move the transmit power of the base station toward the common reference power; and

decreasing the step size if the power control commands from the mobile station move the transmit power of the base station away from the common reference power.

4. (Original) The method of claim 3, wherein increasing the step size comprises changing the transmit power by an adjustment term formed as a sum of a fixed adjustment term and a variable adjustment term.

5. (Original) The method of claim 3, wherein decreasing the step size comprises changing the transmit power by an adjustment term formed as a difference of a fixed adjustment term and a variable adjustment term.

6. (Original) The method of claim 2, wherein varying the step size of the power adjustment at each base station based on a difference between the current transmit

power of the base station and the common reference power comprises calculating the step size based on a fixed adjustment term dependent on the power control commands from the mobile station and a variable adjustment term proportional to the difference between the current transmit power of the base station and the common reference power.

7. (Original) The method of claim 6, wherein calculating the step size comprises:
selecting one of a fixed upward adjustment value and a fixed downward adjustment value as the fixed adjustment term based on the power control commands from the mobile station; and
calculating the variable adjustment term by subtracting the common reference power from the current transmit power of the base station.
8. (Original) The method of claim 7, wherein calculating the step size further comprises combining the fixed adjustment term with the variable adjustment term.
9. (Original) The method of claim 7, wherein calculating the variable adjustment term by subtracting the common reference power from the current transmit power of the base station further comprises multiplying the variable adjustment term by a convergence coefficient.
10. (Original) The method of claim 9, further comprising setting a magnitude of the convergence coefficient to set a sensitivity of the power adjustment to the difference

between the current transmit power of the base station and the common reference power.

11. (Original) The method of claim 1, wherein adjusting the common reference power based on reported frame errors at the mobile station comprises adjusting the common reference power upward if the mobile station sends a frame error report.

12. (Original) The method of claim 11, wherein adjusting the common reference power based on reported frame errors at the mobile station further comprises:

receiving an error report from the mobile station at a base station controller communicatively couple to the base stations; and
signaling the base stations such that the common reference power is adjusted upward by a predetermined increment value.

13. (Original) The method of claim 12, wherein adjusting the common reference power based on reported frame errors at the mobile station further comprises signaling the base stations such that the common reference power is adjusted downward by a predetermined decrement value if no error report is received from the mobile station within a defined period.

14. (Previously amended) The method of claim 13, wherein the predetermined decrement value is smaller than the predetermined increment value.

15. (Original) The method of claim 13, wherein the defined period defines an adjustment rate for the common reference power that is slower than a rate at which the power control commands are received from the mobile station at the base stations.

16. (Original) The method of claim 13, wherein the adjustment rate is a frame rate of forward link data frames defined for forward link signaling between the base stations and the mobile station.

17. (Original) The method of claim 16, wherein the power control commands from the mobile station are received at the base stations at sixteen times the frame rate.

18. (Original) The method of claim 1 wherein the power measurement report from the mobile station includes the number of error frames since the last power measurement report.

19. (Previously amended) A wireless communication network comprising:
a base station controller including at least one processor programmed to
determine a common reference power for a plurality of base stations for a power control interval based on power measurement reports from one or more mobile stations, said power control interval comprising a plurality of power adjustment intervals;
a plurality of base stations under the control of the base station controller for communicating with a mobile station during soft handoff, wherein said

base stations receive power control commands from said mobile station during a plurality of power adjustment intervals in said power control interval and include at least one processor programmed to: adjust a transmit power of the base station during each of said plurality of power adjustment intervals responsive to a power control command from the mobile station by applying a power adjustment to a current transmit power of the base station; and vary a step size of the power adjustment during each of said plurality of power adjustment intervals as a function of the current transmit power and the common reference power.

20. (Original) The wireless communication network of claim 19, wherein the at least one processor in each base station varies the step size of the power adjustment in proportion to a difference between the current transmit power of the base station and the common reference power.

21. (Original) The wireless communication network of claim 20, wherein the at least one processor in each base station increases the step size of the power adjustment if the power control command from the mobile station would move the transmit power toward the common reference power.

22. (Original) The wireless communication network of claim 21, wherein the at least one processor in each base station decreases the step size if the power control

command from the mobile station would move the transmit power away from the common reference power.

23. (Original) The wireless communication network of claim 22, wherein the at least one processor in each base station decreases the step size by computing the step size as a difference between a fixed adjustment term and a variable adjustment term.

24. (Original) The wireless communication network of claim 23, wherein the at least one processor in each base station increases the step size of the power adjustment by computing the step size as a sum of the fixed adjustment term and the variable adjustment term.

25. (Original) The wireless communication network of claim 24, wherein the at least one processor in each base station selects one of a fixed upward adjustment value and a fixed downward adjustment value as the fixed adjustment term based on the power control command from the mobile station.

26. (Original) The wireless communication network of claim 24, wherein the at least one processor in each base station calculates the variable adjustment term as the difference between the common reference power and the current transmit power.

27. (Original) The wireless communication network of claim 26, wherein the at least one processor in each base station calculates the difference between the common

reference power and the current transmit power by subtracting the common reference power from the current transmit power.

28. (Original) The wireless communication network of claim 27, wherein the at least one processor in each base station further calculates the variable adjustment term based on scaling the variable adjustment term by a convergence coefficient to set a sensitivity of step size adjustment to the difference between the common reference power and the current transmit power.

29. (Original) The wireless communication network of claim 19, wherein the at least one processor in the base station controller adjusts the common reference power based on reported errors at the mobile station by:

receiving an error report from the mobile station; and
signaling the base stations such that the common reference power is adjusted upward by a predetermined increment value.

30. (Original) The wireless communication network of claim 29, wherein the at least one processor in the base station controller further adjusts the common reference power by signaling the base stations such that the common reference power is adjusted downward by a predetermined decrement value if no error report is received from the mobile station within a defined reporting period.

31. (Original) The wireless communication network of claim 30, wherein the defined reporting period defines an adjustment rate that is slower than a rate at which the power control commands are received from the mobile station at the base stations.

32. (Original) The wireless communication network of claim 31, wherein the adjustment rate is a frame rate of forward link data frames defined for forward link signaling between the base stations and the mobile station.

33. (Original) The wireless communication network of claim 32, wherein the power control commands from the mobile station are received at the base stations at sixteen times the frame rate.

34. (Original) The wireless communication network of claim 32, wherein the at least one processor in the base station controller maintains an frame timer for timing adjustments to the common reference power.

35. (Original) The wireless communication system of claim 19 wherein the power measurement report from the mobile station includes the number of error frames since the last power measurement report.

36. (Currently amended) A method for controlling a common reference power used by a plurality of base stations during a soft handoff to vary step sizes of forward link transmit power adjustments, said method comprising:

receiving power measurement reports from a mobile station in soft handoff; and
adjusting the common reference power responsive to the power measurement
reports from the mobile station; and

wherein, during each of a plurality of power adjustment intervals, each base
station in said plurality of base stations makes power adjustments to a
current transmit power being used for the mobile station responsive to
power control commands received from the mobile station, and varies the
step sizes used for individual ones of said power adjustments made within
each power adjustment interval, as a function of the current transmit
power and the common reference power.

37. (Original) The method of claim 36 wherein adjusting the common reference power comprises increasing the common reference power responsive to the receipt of a power measurement report from the mobile station.

38. (Original) The method of claim 37 further comprising decreasing the common reference power if no power measurement report is received within a predetermined time period.

39. (Original) The method of claim 38 wherein decreasing the common reference power comprises decrementing the common reference power by a defined downward amount.

40. (Original) The method of claim 39, wherein increasing the common reference power comprises incrementing the common reference power by a defined upward amount, and wherein the defined downward amount is a fraction of the defined upward amount.

41. (Original) The method of claim 36, wherein adjusting the common reference power comprises:

maintaining an interval timer for timing an update interval;
determining whether a power measurement report is received within the update interval; and
incrementing the common reference power if a power measurement report was received during the interval, and decrementing the common reference power if a power measurement report was not received during the interval.

42. (Previously amended) The method of claim 41, wherein maintaining an interval timer comprises maintaining a communication frame timer at a base station controller controlling adjustments of the common reference power.

43. (Original) The method of claim 36 wherein the power measurement report from the mobile station includes the number of error frames since the last power measurement report.

44 -51. (Previously canceled)

52. (Previously added) A method of controlling transmit powers at a plurality of base stations during a soft handoff to reduce power imbalance between base stations, the method comprising:

determining a common reference power for a plurality of base stations for a power control interval based on power measurement reports from one or more mobile stations, said power control interval comprising a plurality of power adjustment intervals;

receiving power control commands from a mobile station in soft handoff during a plurality of power adjustment intervals in said power control interval;

computing a variable adjustment factor for the base stations during each of said plurality of power adjustment intervals as a function of the current transmit powers of the base stations and the common reference power;

adjusting the transmit powers at the respective base stations during each of said plurality of power adjustment intervals responsive to the power control commands from the mobile station based on said variable adjustment factor and a fixed adjustment factor.

53. (Previously added) A wireless communication network comprising:
a base station controller including at least one processor programmed to
determine a common reference power for a plurality of base stations for a power control interval, said power control interval comprising a plurality of power adjustment intervals based on power measurement reports from one or more mobile stations;

a plurality of base stations under the control of the base station controller for communicating with a mobile station during soft handoff, wherein said base stations receive power control commands from said mobile station during a plurality of power adjustment intervals in said power control interval and include at least one processor programmed to:

compute a variable adjustment factor for the base stations during each of said plurality of power adjustment intervals as a function of the current transmit powers of the base stations and the common reference power;

adjust the transmit powers at the respective base stations during each of said plurality of power adjustment intervals responsive to the power control commands from the mobile station based on said variable adjustment factor and a fixed adjustment factor.